

CLAIMS

What is claimed is:

1. An antenna device comprising:

5 a plate antenna formed of a metal plate having a predetermined electrical length and connected via a feeding point thereof with a grounding plate;

 a monopole antenna having an electrical length different from the electrical length of the plate antenna and being connected with the plate
10 antenna; and

 a plurality of linear antennas connected with the plate antenna and each having an electrical length different from the other and different from both the electrical length of the plate antenna and the monopole antenna.

15 2. An antenna device as set forth in claim 1, wherein:

 the electrical length of the plate antenna is approximately one-eighth of a wavelength in the 2 GHz band;

 the sum of the electrical lengths of the monopole antenna and the plate antenna is approximately one-quarter of a wavelength in the 800
20 MHz band; and

 the sum of the electrical length of a first of the linear antennas and the electrical length of the plate antenna is approximately one-quarter of a wavelength in the 1.5 GHz band, and the sum of the electrical length of a second of the linear antennas and the electrical length of the plate antenna
25 is approximately one-quarter of a wavelength in the 2.0 GHz band.

3. An antenna device as set forth in claim 2, wherein:

the plate antenna has a square form, and its feeding point is in the proximity of one of the vertexes of the square; and

5 the monopole antenna and the first and second linear antennas are connected onto an end of the plate antenna across from said one of the vertexes.

4. An antenna device as set forth in claim 1 provided with a helical
10 antenna instead of the monopole antenna.

5. An antenna device as set forth in claim 4, wherein:

the electrical length of the plate antenna is approximately one-eighth of a wavelength in the 2 GHz band;

15 the sum of the electrical lengths of the helical antenna and the plate antenna is approximately one-quarter of a wavelength in the 800 MHz band; and

the sum of the electrical length of a first of the linear antennas and the electrical length of the plate antenna is approximately one-quarter of a
20 wavelength in the 1.5 GHz band, and the sum of the electrical length of a second of the linear antennas and the electrical length of the plate antenna is approximately one-quarter of a wavelength in the 2.0 GHz band.

6. An antenna device as set forth in claim 5, wherein:

25 the plate antenna has a square form, and its feeding point is in the

proximity of one of the vertexes of the square; and

the helical antenna and the first and second linear antennas are connected onto a side of the plate antenna across from said one of the vertexes.

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7. A portable telephone including an antenna device, the antenna device comprising:

10 a plate antenna formed of a metal plate having a predetermined electrical length and connected via a feeding point thereof with a grounding plate;

a monopole antenna having an electrical length different from the electrical length of the plate antenna and being connected with the plate antenna; and

15 a plurality of linear antennas connected with the plate antenna and each having an electrical length different from the other and different from both the electrical length of the plate antenna and the monopole antenna.

8. A portable telephone as set forth in claim 7 provided with a helical antenna instead of the monopole antenna.

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